

**VOLUNTARY CLEANUP COMPLETION REPORT
FOR THE
GRAND VIEW SMELTER SITE
RICO, COLORADO**

Prepared for:

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SEP 22 1999

September 17, 1999

CERTIFICATION OF COMPLETION

ESA Consultants Inc. ("ESA") hereby certifies that the voluntary cleanup of the **Grand View Smelter Site, Rico, Colorado** has been fully and properly implemented in accordance with the cleanup plan approved on June 21, 1996 by the Colorado Department of Public Health and Environment.

ESA attests that it is fully qualified and has sufficient knowledge in this matter to so certify because ESA has been responsible for providing ARCO with both technical and permitting support since the beginning of the voluntary cleanup process. Specific activities completed by the ESA project team in support of voluntary cleanup plan development and implementation are summarized as follows:

1. Preparation of the approved voluntary cleanup plan application which includes the ESA's statement of qualifications and the qualifications of individual contributors.
2. Design analysis, as necessary, to develop mine waste removal and containment approaches that provide adequate permanent protection of human health and the environment.
3. Development of detailed construction design drawings and specifications under the supervision of an ESA registered Professional Engineer.
4. Preparation of all permit applications required for voluntary cleanup construction.
5. Engineering services during construction: 1) inspections for conformance with design specifications, 2) development of design modifications to address special conditions encountered during construction, 3) fill compaction verification testing, and 4) confirmation soil sampling and analysis for verification of waste treatment (agricultural lime) application rates and waste removal.
6. Post-construction services: 1) assistance with the construction completion report, 2) annual site stabilization inspections, repair, and maintenance operations, 3) annual vegetation surveys, 4) annual reporting of stormwater permit compliance monitoring results and corrective actions taken, and 5) preparation of construction stormwater permit inactivation request.



Edmund J. Schneider, P.G.

Vice President

ESA Consultants Inc.

TABLE OF CONTENTS

CERTIFICATION OF COMPLETION

1.0	INTRODUCTION	1
1.1	General	1
1.2	Cleanup Plan Implementation Reports and Notices	1
1.3	Cleanup Goal and Objectives	2
2.0	SUMMARY OF PRE-CLEANUP SITE CONDITIONS AND ISSUES	2
3.0	SUMMARY OF IMPLEMENTED REMEDY	3
3.1	Major Components of the Remedy	3
3.2	Hydrologic Controls	3
3.3	Reclamation Cover	4
4.0	CONSTRUCTION/ACCESS PERMITS AND RELEASES	5
4.1	Permits	5
4.2	Status of Grand View Smelter Site Stormwater Discharge Permit	5
5.0	RISK ASSESSMENT	5

FIGURES

(follows page)

Figure 1-1	Rico District Location Map	1
Figure 1-2	Grand View Smelter Site Location Map	1

APPENDIX

INACTIVATION NOTICE
STORMWATER DISCHARGE PERMIT

**Voluntary Cleanup Completion Report
for the
Grand View Smelter Site
Rico, Colorado**

1.0 INTRODUCTION

1.1 General

This report provides, or incorporates by reference, evidence in support of the ARCO Environmental Remediation L.L.C. petition for a "No Further Action" determination, subsequent to completion of the voluntary cleanup of the Grand View Smelter Site in Rico, Colorado. The voluntary cleanup plan for the Grand View Smelter Site has been developed, approved, and fully implemented in accordance with the Colorado Voluntary Cleanup and Redevelopment Act.

Information included in this report is summarized as follows:

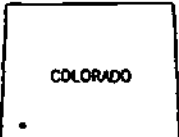
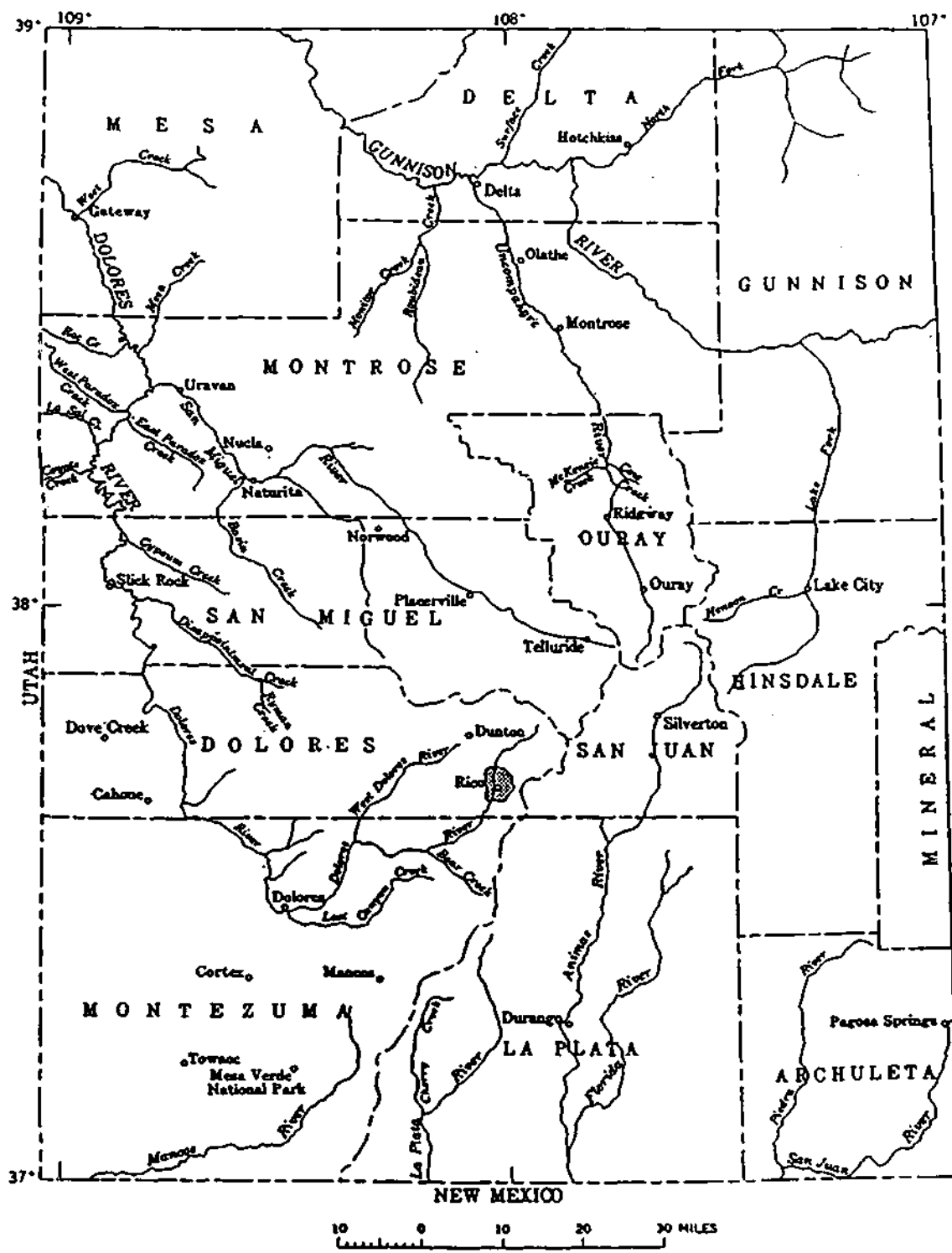
- References for a variety of voluntary cleanup plan implementation reports (e.g. construction completion and maintenance) previously submitted to the Colorado Department of Public Health and Environment ("Department").
- Summary of cleanup objectives, site conditions, issues, and implemented remedial measures.
- Summary of permits/approvals acquired for construction, compliance reports, and releases.
- Risk assessment based on the selected remedy for the designated land use of the site.

Figure 1-1 shows the location of Rico in southwestern Colorado. Figure 1-2 shows the location of the site within the Dolores River valley in the Town of Rico. Inactivation notice information for the Grand View Smelter Site mining stormwater discharge general permit certification is provided in the Appendix.

1.2 Cleanup Plan Implementation Reports and Notices

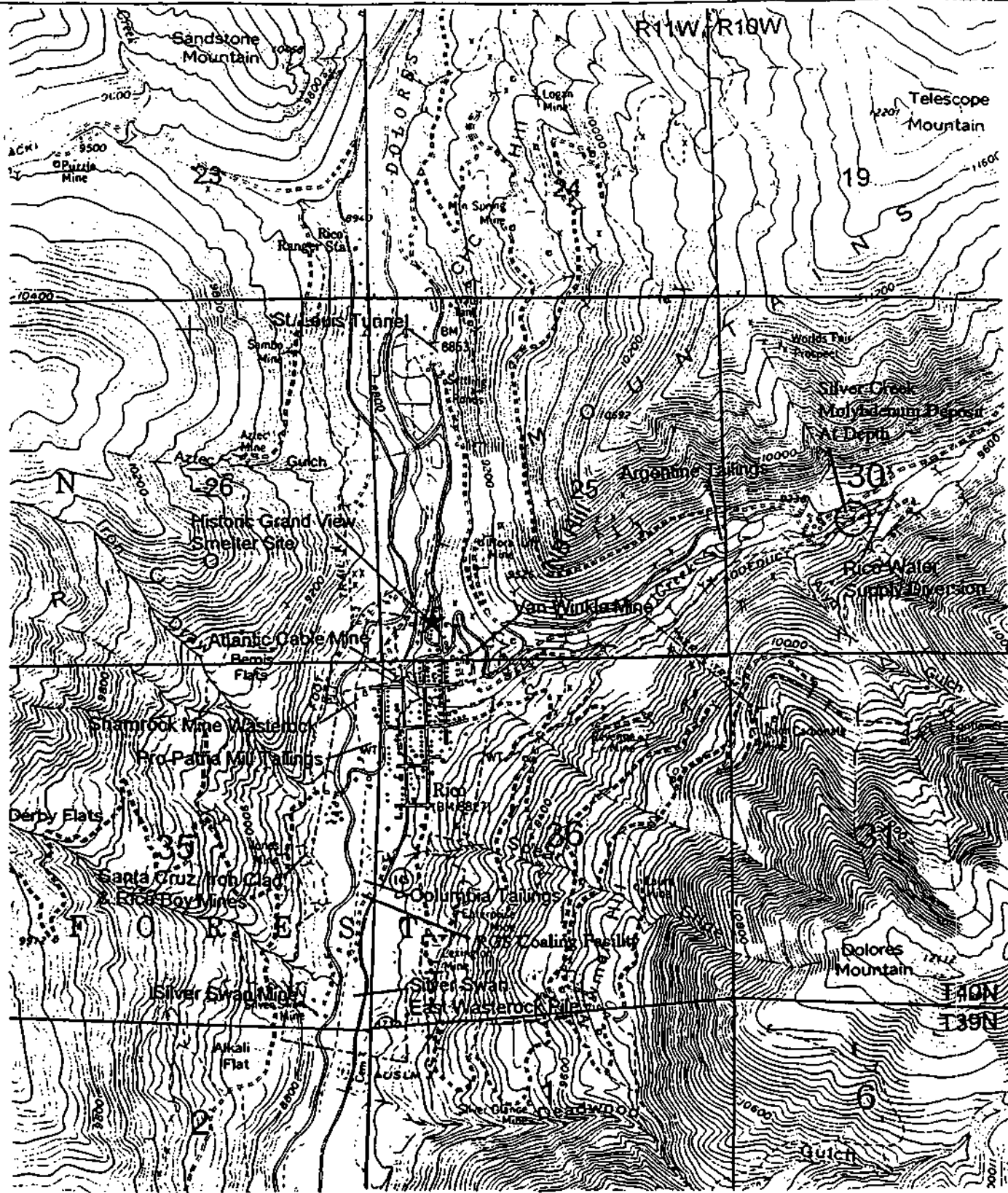
The following documents previously submitted to the Department and incorporated herein by reference provide substantial evidence that ARCO has complied with the voluntary cleanup plan, as approved by the Department on June 21, 1996.

Voluntary Cleanup and Redevelopment Act Application for Grand View Smelter Site, Rico, Colorado. April 12, 1996. Atlantic Richfield Company, Los Angeles and Rico Properties, L.L.C. Submitted to Colorado Department of Public Health and Environment, Denver.



RICO DISTRICT
LOCATION MAP

FIGURE 1-1



CONTOUR INTERVAL 40 FEET

GRAND VIEW SMELTER SITE LOCATION MAP

FIGURE 1-2

Section lines added.

Base Map: USGS Rico Quadrangle, Colorado, 7.5 Minute Series.

Rico Mining Area Construction Completion Report. January 1997. Atlantic Richfield Company, Los Angeles. Prepared by Anderson Engineering Co., Inc., Salt Lake City.

Rico Site Remediation Project 1997 Maintenance Completion Report. October 1997. ARCO Environmental Remediation L.L.C., Los Angeles. Prepared by ESA Consultants Inc., Fort Collins.

Rico Site Remediation Project 1998 Maintenance Completion Report. November 1998. ARCO Environmental Remediation L.L.C., Los Angeles. Prepared by ESA Consultants Inc., Fort Collins.

Inactivation Notice for Mining Stormwater Discharge Permit Certification No. COR-040189, with attached Technical Memorandum - Reclamation Monitoring Results for the Grand View Site. ARCO Application to the CDPHE Water Quality Control Division, signed September 17, 1999.

1.3 Cleanup Goal and Objectives

The goal of the approved voluntary cleanup plan for the historic mine area is to provide adequate protection of human health and the environment for the designated land use of the site. The essential objectives of the selected remedy addressed by the plan are to:

- Provide permanent solutions to eliminate or minimize, to the maximum extent practicable, the potential for release of mine waste constituents to surface and ground water systems.
- Prevent human ingestion of contaminated waste material in areas where inhalation of dust or direct contact could potentially pose an unacceptable health risk for the land use designated in the voluntary cleanup plan.
- Prevent any unnecessary disturbance of the Dolores River during VCUP remedial activities.

2.0 SUMMARY OF PRE-CLEANUP SITE CONDITIONS AND ISSUES

Major conditions and issues addressed by the cleanup plan for the Grand View Smelter Site include:

- Land ownership: One private property owner for two patented mining claims
- Area: approximately 1.7 acres with contributory drainage basin area of about 25 acres; estimated 1 acre of buried mine waste and 0.4 acres of exposed waste
- Mine waste volume and type of potential contaminants: unknown volume of mineralized mine waste containing heavy metals (predominantly cadmium, lead, manganese, and zinc) derived from historic smelter operations

- Pre-VCUP land use: Undeveloped vacant land
- Future land use: Commercial/Residential including new access road from Highway 145
- Issues: 1) human contact with exposed waste; 2) water contact with waste from direct rainfall/snowmelt, and runoff; 3) northwest edge of site susceptible to erosion during Dolores River 500-year flood event; and 4) other disturbed areas poorly vegetated and susceptible to erosion

3.0 SUMMARY OF IMPLEMENTED REMEDY

3.1 Major Components of the Remedy

Major components of the implemented remedy for mine waste material and reclamation of the site included:

- Reclamation cover to eliminate direct human contact with mine waste considering the proposed future use of the property.
- Consolidation and stabilization of mine waste-left-in-place against wind and surface water erosion to prevent off-site dispersal of mine waste material.
- Runon, runoff, and infiltration controls to eliminate or minimize transport of soluble mine waste constituents to ground water and surface water receptors.
- Installation of new access road from Highway 145 with perimeter fencing to minimize site disturbance.

3.2 Hydrologic Controls

Where necessary, engineered hydrologic controls for runoff, infiltration, and flood protection were constructed to permanently minimize water contact with waste material and achieve permanent containment of waste-left-in-place.

Waste surface re-configuration and reclamation cover. The majority of the land surface at the Grand View site was adequate for drainage. Only a relatively small area (0.3 acres) occupied by mine waste was graded to conform to the adjacent land shape. The reclamation cover is described below.

Surface water diversion ditches. The newly constructed access road entering the site was constructed with "v" notch diversion ditches to direct runoff away from reclaimed surfaces. Runon from rainfall or snowmelt upland of the site is of a very minor quantity and the existing slopes are sufficient to promote controlled flow of stormwater.

Dolores River flood protection revetment. Riprap and toe erosion protection was constructed along the Dolores River bank for protection against the 500-year flood event.

Approximately 170 c.y. of riprap was placed along the northwest slope of the Grand View Smelter Site (approximately 100 feet) as a flood protection revetment.

3.3 Reclamation Cover

A stabilizing reclamation cover was placed on all disturbed areas and areas with exposed waste material to provide permanent protection against wind and water erosion, infiltration control, protection against human and wildlife contact with waste materials, and enhancement of river corridor aesthetics. Components of the reclamation cover are summarized below.

Growth medium. A small amount of borrow soil was placed at the Grand View site to promote vegetation growth for erosion control. Approximately 800 c.y. of material were spread adjacent to the access road and over the area where the mine waste material was graded. A local source of soil borrow material free of mine waste and debris was developed for this site. The borrow area was closed and revegetated after completion of site cleanup.

Vegetation cover. A seed mixture of native grasses and forbes (general seed mix) was used where appropriate to establish a protective vegetation cover on all disturbed areas. Fertilizer and hydromulch amendments were applied at the time of seeding to enhance plant establishment. Seed mixture and amendment application rates are provided in the construction completion report. The surface stability criterion proposed to the Department (Water Quality Control Division) under the stormwater discharge permit program was achievement of a minimum average cover of 50 percent combined plant and rock fragments.

Initial seeding of the disturbed areas designated for vegetative cover was completed during the second week of October 1996. Two annual revegetation inspections have been performed since construction completion, one in July 1997 and the other in September 1998 near the end of the growing season. Drought conditions in June 1997 prevented development of adequate plant cover during the first growing season. In addition, a small portion of the site (approximately 0.3 acres) was periodically used as a parking area following the initial seeding. As a result, the surface of this area was compacted and poorly vegetated. Consequently, the disturbed area had to be prepared by disk harrow, reseeded, fertilized, and mulched in October 1997. Monitoring results for the 1998 Grand View Smelter Site inspection indicate a stable surface was achieved on the site. However, revegetation of the site was voluntarily considered incomplete because of continued vehicle disturbance at the site. Additional reclamation activities prior to the 1999 growing season included resoiling of the disturbed area and the construction of perimeter fencing to prevent further site disturbances.

Quantitative results for the 1999 Grand View Smelter Site inspection indicate a stable surface was achieved on the site. Plant cover averaged about 41 percent (range of 29 to 56 percent) and the rock fragment cover averaged about 39 percent (range of 26 to 48 percent), resulting in a total average surface cover of about 79 percent.

4.0 CONSTRUCTION/ACCESS PERMITS AND RELEASES

4.1 Permits

The following listed permits were obtained by ARCO or the property owners as required to implement the approved voluntary cleanup plan. No other approvals were required to implement the plan.

- Stormwater Discharge Permit, CDPS Permit No. COR-040189; request for termination submitted to the CDPHE Water Quality Control Division, signed September 17, 1999.
- Corps of Engineers Nationwide General Permit No. 38, Cleanup of Hazardous and Toxic Wastes; expiration date was January 21, 1997.

4.2 Status of Grand View Smelter Site Stormwater Discharge Permit

As noted above, a stormwater discharge permit inactivation notice has been submitted to CDPHE. The inactivation notice has been requested based on the plant and rock fragment cover achieved, observed stability of the site surface, and the construction of permanent hydrologic control structures. The Technical Memorandum describing the reclamation results for the site, as submitted with ARCO's request for termination of the stormwater discharge permit, are provided in the Appendix.

5.0 RISK ASSESSMENT

A key consideration in assessing risk associated with reclaimed mine waste left-in-place at the Grand View Smelter Site is the extent of human or environmental exposure when the property is used for the purpose identified in the approved voluntary cleanup plan (commercial/residential). Completion of the voluntary cleanup has achieved reduction of risk to human health and the environment through the following:

- Reclamation of waste-left-in-place minimizes human and environmental exposure pathways.
- Stabilization of contaminated waste-left-in-place provides long-term minimization of human and environmental exposure pathways.
- Control of site access and covering of exposed contaminated mine waste prevent direct human contact and minimizes human exposure pathways.

To assure the protection of human health, and to protect against environmental releases, effective closure of mine waste left-in-place has been achieved by waste construction of several permanent and durable non-point source waste containment measures. For long-term effectiveness, emphasis was placed on "passive-care" approaches. These measures prevent direct human contact and provide long-term control of major contaminant migration pathways, including wind and surface water erosion, contaminated surface water runoff, and infiltration and seepage. Consequently, these

measures eliminate or effectively reduce potential mine waste impacts to: 1) the beneficial uses of the waters of the State, 2) surrounding ecosystems, and 3) human health due to adsorption, ingestion, and/or inhalation of waste particles.

In addition, post-remediation site monitoring and maintenance activities provide evidence that the property, when used for the purpose identified in the cleanup plan, is protective of human health and the environment. Results of annual site stabilization inspections required under the Department's stormwater discharge permit program verified that the structural measures (such as flood protection and drainage diversion structures) are functioning as designed.

Results of the annual inspections have also verified the stability of the surface cover. Proposed surface stability criterion for adequate plant and rock fragment cover protection of the reclaimed mine waste area were achieved by the end of the third growing season. As discussed above, achievement of adequate site stability has resulted in the request for inactivation of the stormwater discharge permit (see Appendix).

In addition to the implemented remedial measures, site accessibility constraints further reduce potential human health risk by limiting the opportunity for direct human contact. Although the site is easily accessible from Highway 145, perimeter fencing serves as a supplemental control measure to protect the integrity of reclaimed areas against vehicle access and disturbance.

APPENDIX

INACTIVATION NOTICE STORMWATER DISCHARGE PERMIT

Colorado Department of Public Health & Environment
Water Quality Control Division
WQCD-P-B2
4300 Cherry Creek Drive South
Denver, Colorado 80246-1530

FOR AGENCY USE ONLY			
rec.			
eff.			
	Year	Month	Day

INACTIVATION NOTICE FOR

MINING STORMWATER DISCHARGE GENERAL PERMIT CERTIFICATION

Please print or type. Form must be filled out completely.

Certification Number: COR-04 0 1 8 9 Taxpayer ID or EIN 9 5 4 6 0 9 7 7 7
-OR- COG-50 _____

Permittee (Company) Name: Atlantic Richfield Company

Permittee Address: ARCO Environmental Remediation, L.L.C.
307 E. Park Street, Suite 400
Anaconda, Montana 59711 Phone No. (406) 563 5211 ext. 413

Mine/Facility Name: Grand View Site

Mining Site Address/Location: Highway 145, Rico, Colorado

County: Dolores County Contact Person: Charles Stilwell

Reason/justification for inactivation, and description of final site stabilization. (Attach any supporting documentation, such as proof of Mined Land Reclamation Board bond release): Voluntary remediation of this inactive mine waste pile was completed in October 1996. The attached Technical Memorandum provides a summary of site characteristics, permanent remedial measures, reclamation results, and proposed success criteria revision for this site.

I certify under penalty of law that by the date of my signature below, all disturbed soils at the identified mining site have been finally stabilized; all temporary erosion and sediment control measures have been removed; all mining and equipment maintenance waste have been disposed of properly; and all elements of the Stormwater Management Plan have been completed.

I understand that by submitting this notice of inactivation, I am no longer authorized to discharge stormwater associated with mining activity by the general permit. I understand that discharging pollutants in stormwater associated with mining activities to the waters of the State of Colorado, where such discharges are not authorized by a CDPS permit, is unlawful under the Colorado Water Quality Control Act and the Clean Water Act.

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein, and based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (See 18 U.S.C 1001 and 33 U.S.C. 1319.)

Charles T. Stilwell
Signature of Permit Applicant (Legally Responsible Party)

Charles T. Stilwell

Name (printed)

9/17/97
Date Signed

Project Manager
Title

TECHNICAL MEMORANDUM

RECLAMATION MONITORING RESULTS FOR THE GRAND VIEW SITE

Mining Stormwater Discharge General Permit Certification No.: COR-040189

September 14, 1999

Introduction

The historic, inactive Grand View Site is one of eight areas for which a Colorado Stormwater Discharge Permit was issued to Atlantic Richfield Company in association with five approved Voluntary Cleanup Plans (VCUPs) implemented under the Voluntary Cleanup and Redevelopment Act (VCRA). Environmental baseline fieldwork associated with this project was begun in the Spring of 1995, followed by engineering and reclamation planning activities. Mine waste remediation construction work was completed in 1996. The first annual revegetation inspection was completed in July 1997, in a qualitative manner, and remedial measures recommended. Remedial measures were completed by October 1997. On September 8, 1998 the second annual revegetation inspection of this site was completed and quantitative vegetation cover data collected by Cedar Creek Associates, Inc. Due to disturbances by non-ARCO personnel in the Fall of 1998, permit termination was not applied for following the revegetation inspection. Additional reclamation measures were completed in the form of resoling and fencing to remediate these disturbances. The third revegetation monitoring inspection was completed on September 10, 1999.

The following paragraphs detail the overall characteristics of the Grand View Site and the results of annual revegetation monitoring activities. The VCUP for this inactive mine waste site is described in the document *Voluntary Cleanup and Redevelopment Act Application for Grand View Smelter Site-Rico, Colorado* submitted in April 1996 to the Colorado Department of Public Health and Environment by Atlantic Richfield Company and Rico Properties, L.L.C. Remedial measures completed in 1997 are described in the document *Rico Site Remediation Project-1997 Maintenance Completion Report* submitted in October 1997 to ARCO Environmental Remediation L.L.C. by ESA Consultants, Inc. Remedial measures completed in 1998 are presented in the document *Rico Site Remediation Project-1998 Maintenance Completion Report* submitted in November 1998 to ARCO Environmental Remediation L.L.C.

General Site Characteristics and Site Remediation History

Original Disturbed Area: 1.7 acres with maximum angles of approximately 33 percent.

Original Material Composition: Sandy loam slag and mine waste with low pH values (6.1) and high rock fragment contents (65+ percent) along with unsampled soil stockpile material.

1996 Remediation Summary: Grade site to engineering specifications; spread existing soil stockpile material (800 cu. yds.) to a depth of 24 inches; construct flood protection revetment on bank of Dolores River; construct gravel access road through site; complete revegetation sequence (seedbed preparation, fertilization, seeding, mulching); construct recreational facilities. All soil disturbing activities at the site were completed in September 1996.

Results of July 1997 Qualitative Monitoring: Revegetation success acceptable over majority of area for first year; no exposed mine waste noted; surface stable except for one slump and three erosion gullies; 2 to 15 percent vegetation cover estimated visually with 50 to 60 percent surficial coarse fragment cover.

Remedial Measures Recommended in 1997: Repair rills, gullies, and slump; fertilize; and reseed (at four times the base rate) 3 acres of this site for which revegetation had not achieved the desired results at the end of the first growing season. The suggested remedial measures were completed in early October 1997.

Results of September 1998 Quantitative Monitoring: Percent plant cover and rock fragments averaged 40.2 and 28.8 percent across the five transects completed on the site. Percent average cover provided by plants and rock fragments totaled 69.0 percent. No rilling or gullying was observed anywhere on site indicating a stable reclaimed surface. Though the total cover percentage provided by vegetation and rock fragments met the proposed success criteria, ARCO did not request permit termination for this site. ARCO proposed that the disturbances created by non-ARCO personnel be remediated before permit termination was requested.

Remedial Measures Recommended in 1998: Resoiling and reseedling the 1998 disturbance was requested of the party responsible. Resoiling was completed prior to the Spring of 1998. It is uncertain whether reseedling was completed. The portion of the site bordering the road was also fenced to prevent further site disturbances.

Results of 1999 Quantitative Monitoring

Revegetation monitoring at the Grand View Site was completed on September 10, 1999. As requested in the permit issued by the Colorado Department of Public Health and Environment, vegetation cover was measured to determine whether existing surficial conditions warrant the termination of this permit following three growing seasons. Vegetation cover was measured using the "point-intercept" methodology. A laser-powered "Optical-Point Bar" developed by Cedar Creek Associates, Inc. was employed to gather plant cover data. To complete data collection, five ten-meter transects were located in areas selected as representative of plant cover across this 1.7-acre site. Point-intercept data was collected at 0.1-meter intervals along each 10 meter transect such that 100 data points were collected per transect. Each data point could represent a bare ground, litter, rock (coarse fragments > 2 mm. in size) or vegetation "hit". Vegetation hits were recorded by species or genus where a plant could not be identified

to species level. A total of 500 data points were collected at this site. Achieving statistical adequacy was not considered to be necessary as per the termination criteria specified in the stormwater permit issued.

Plant cover across the five transects traversed ranged from 29.0 to 56.0 percent with an average of 40.8 percent. Dominant species identified along the transects included *Bromus carinatus* (mountain brome), *Agropyron dasystachyum* (thickspike wheatgrass), *Poa pratensis* (Kentucky bluegrass) and *Trifolium repens* (white Dutch clover). Twenty-two additional species were also found along the transects or were recorded as incidental species at the Grand View Site. These species included grass, forb, and shrub life-forms, represented by such species as *Festuca ovina* (sheep fescue), *Melilotus officinalis* (yellow sweetclover), and *Salix exigua* (coyote willow). Though the overall plant cover values did not vary greatly from 1998 values, it may be noted by comparing photos from 1998 and 1999 that overall plant vigor has greatly increased on site. Grass and forb seedheads were the norm and vegetation production had increased significantly based on visual estimates.

The percent of surface covered by rock fragments ranged from 26.0 to 48.0 percent with an average of 38.6 percent. Litter and bare ground averaged 4.2 and 16.4 percent, respectively.

A copy of the data sheet completed in the field is included at the end of this Technical Memorandum, as are two representative photographs taken of the site during the monitoring work.

Monitoring Data Summary and Proposed Vegetative Cover Criterion Revision

Across five representative transects, surface cover by plants and rock fragments averaged 40.8 and 38.6 percent, respectively. Together, plants and rock fragments covered an average of 79.4 percent of the revegetated surface of the Grand View Site as compared to 69.0 percent in 1998. No rilling or gullyng was observed anywhere on this site during the 1999 monitoring field work. Minor sheet erosion is assumed to have occurred but there is no evidence of soil accumulation along the toes of constructed slopes. This site, presumably due to the high percent of surficial rock cover, exhibited limited erosion in 1997 and 1998. This situation continues on to the end of the 1999 growing season resulting in a stable site surface supporting a comparatively vigorous vegetation community.

The stormwater permit termination criterion for vegetation cover requires that "vegetation has been established with an average cover or density, over the previously disturbed area, of a minimum of 40 percent vegetative cover or 70 percent of the vegetative cover of a similar undisturbed site, whichever is higher....." The permit goes on to say that the Division may "after consultation with the permittee and upon good cause being shown, revise the cover requirement on a case-by-case basis".

Color Photo(s)

The following pages
contain color that does
not appear in the
scanned images.

To view the actual images, please
contact the Superfund Records
Center at (303) 312-6473.

PHOTO LOG OF THE GRAND VIEW SITE

Photos Taken September 9, 1999

Photo #	Description
1	Near northern project area border looking south across site.
2	Near western project area border looking east across southern one-half of site.



CEDAR CREEK ASSOCIATES, INC.

Point Intercept Ground Cover

[illegible]